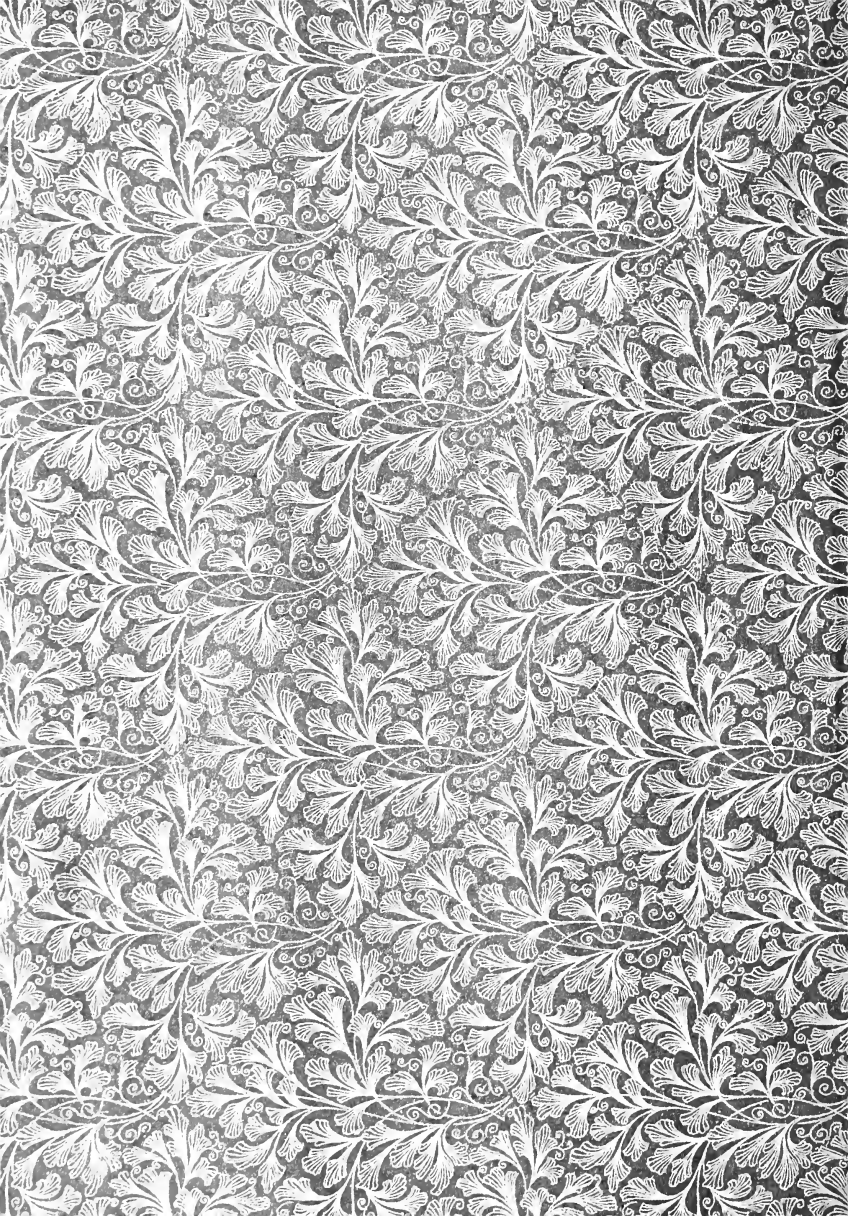


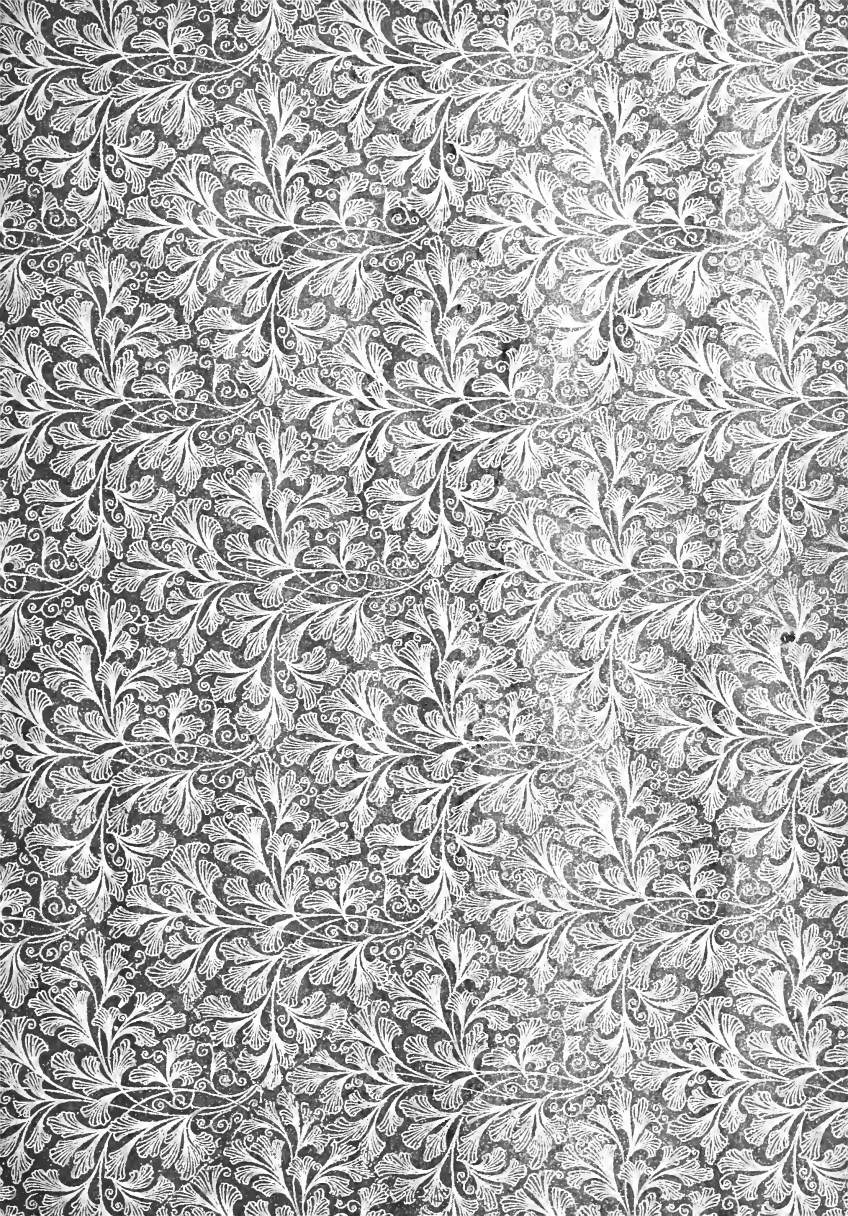
SARATOGA MINERAL WATERS

DIRECTIONS FOR THEIR USE


BY

DR. W. O. STILLMAN



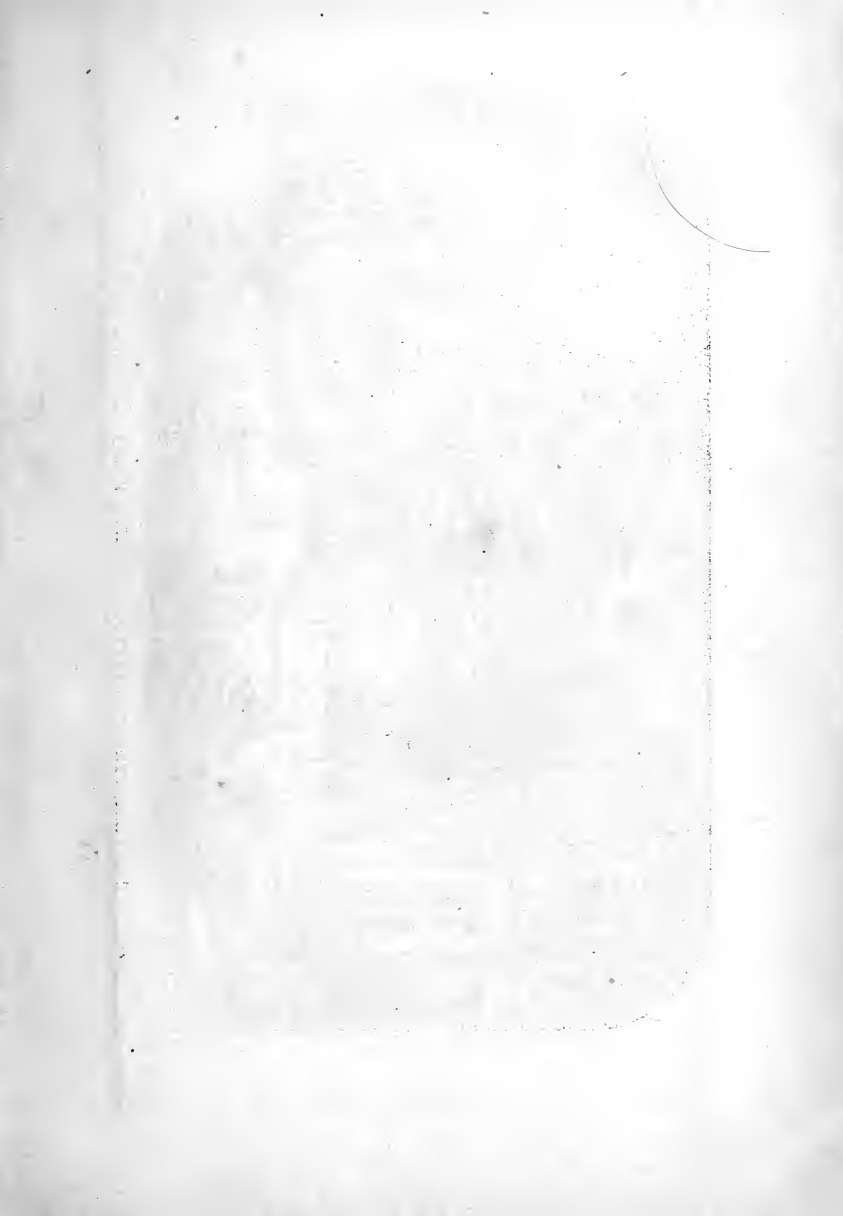


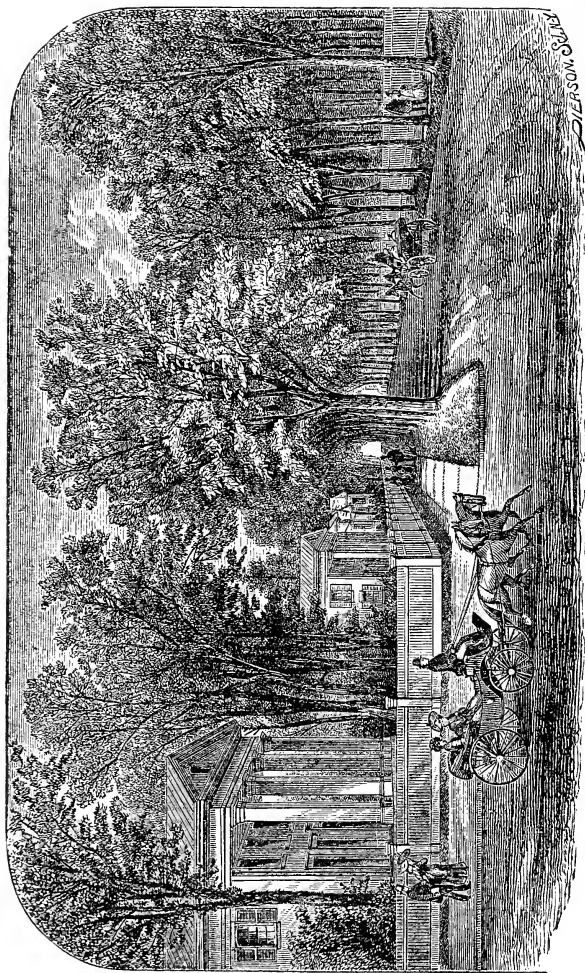
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CIRCULAR STREET, SARATOGA SPRINGS, looking south from Union Avenue.

A

GUIDE

TO THE USE OF THE

SARATOGA MINERAL WATERS.

BY

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OF SARATOGA SPRINGS, N. Y.,

MEMBER OF THE ALBANY COUNTY MEDICAL SOCIETY;

FELLOW OF THE ALBANY ACADEMY OF MEDICINE;

MEMBER OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT
OF SCIENCE, ETC.

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THE substance of this Guide was embraced in a paper read before the Albany County Medical Society, February 25, 1880, and subsequently published in the *Philadelphia Medical and Surgical Reporter* for May 22d and 29th, of the same year. It contains original and collected material, and presents for the first time, so far as I am aware, a complete classification of the waters.

The directions and therapeutical advice contained in this Guide are not in the least intended to supersede the services of a physician, with whom consultation is in all cases desirable, and in grave ones imperatively necessary. It is estimated that from forty thousand to sixty thousand people visit the springs every season. Nearly all use the waters—usually under the questionable advice of hall-boys or porters, or the directions of friends as ignorant as themselves. Frequently unpleasant and even serious consequences result. In the absence of governmental supervision, such as is practiced in some foreign countries, a clear, concise, and practical guide is needed. This one is presented for public approbation.

W. O. S.

SARATOGA SPRINGS, N. Y., May, 1881.

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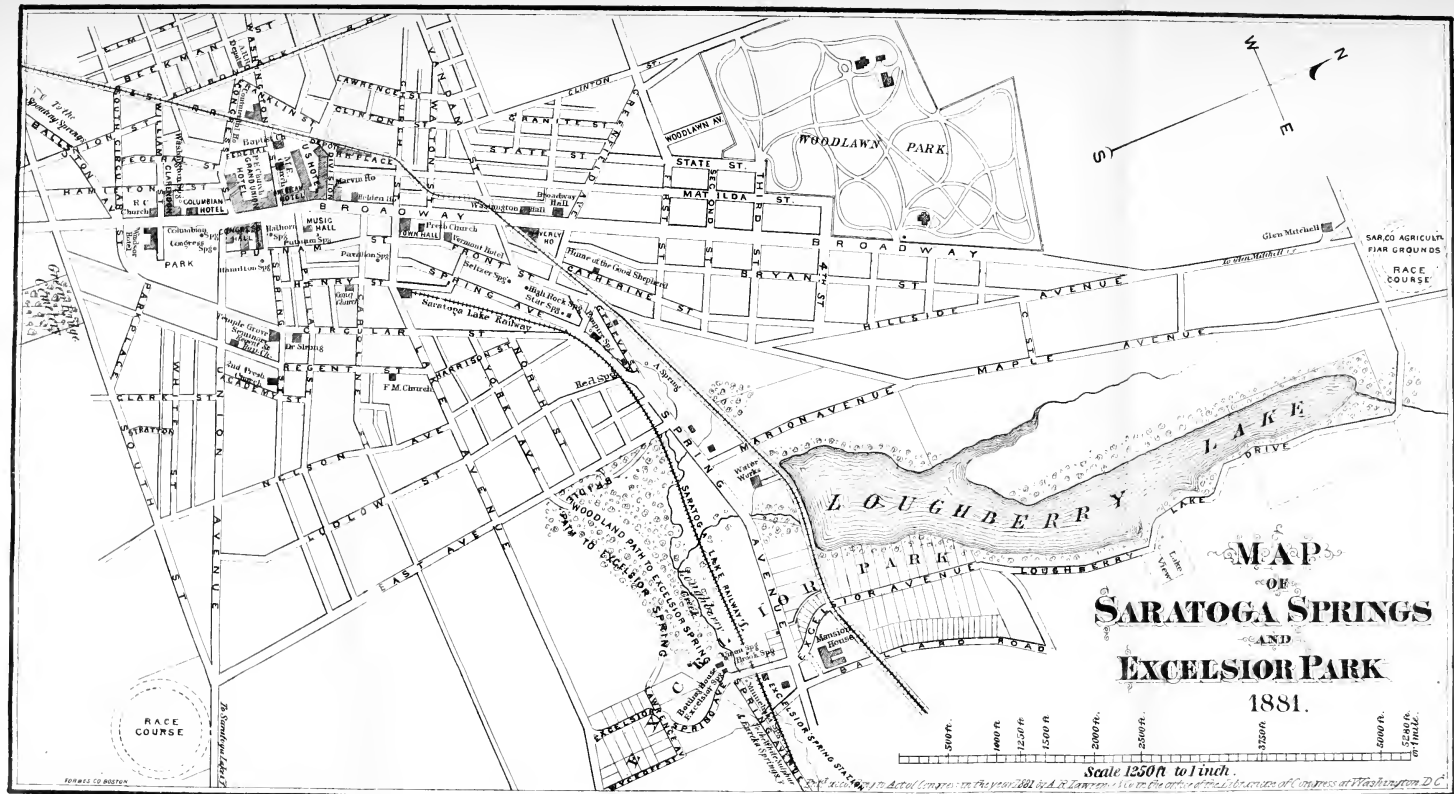
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CLASSIFICATION.

It is a common impression, frequently expressed among even the well-informed, that all Saratoga waters are alike in their composition and action on the body. That this is a very grave mistake is often realized to their sorrow by amateur experimenters. A simple method of classification is presented, which, it is hoped, will give a better idea of the actions and uses of the waters. They are divided into five varieties : *

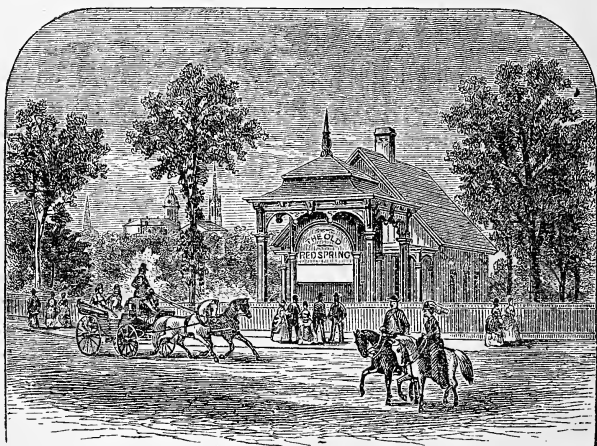
- 1st. Cathartic, or saline laxative waters.
- 2d. Alterative and diuretic waters.
- 3d. Iron (tonic), or saline chalybeate waters.
- 4th. Alkali, or alkaline saline waters.
- 5th. Sulphur, or sulphurous and sulphureted waters.

In connection with this classification is presented the table of analyses of seventeen of the principal springs, each in its appropriate division. They do not include three of the sulphur springs, whose chief ingredients are merely mentioned. Excluding the last named, as exceptions, they present mostly the same constituents in vastly varying proportions. It is true of them, as has been said by a distinguished foreign chemist of the mineral springs of Europe, that the detection of almost every known element in them seems to depend only upon the delicacy of chemical manipulation. And yet they vary vastly in their effects upon

* A strictly chemical classification might be made as follows :

- 1st. Acidulous muriated alkaline waters, No. 1.
- 2d. Acidulous muriated alkaline waters, No. 2.
- 3d. Acidulous muriated chalybeate waters.
- 4th. Acidulous alkaline muriated waters.
- 5th. Sulphurous and sulphureted waters.

the system. In some of the springs the cathartic principle is almost lacking, as in the Red Spring, Vichy, or Seltzer. Again, the cathartic is strong but the alkaline very weak, as in the Hathorn ; or the alkaline predominates over all others, as in the Vichy. In some the iron is scarcely traceable ; in others, as the Columbian and Putnam, it is so strong that the waters must be taken with great care, or violent headache follows. The sulphurous waters introduce still another element, differing from any which an ordinary analysis discloses in the other springs.



THE RED SPRING.

In the first and second varieties the distinction is almost solely due to the varying quantities of the constituents ; the second not having sufficient laxative properties to be termed cathartic, operating, therefore, principally on the kidneys and various secretions, and in some instances possessing valuable additional alterative factors. Perhaps it is to the half-guessed-at elements, or others yet unknown, that some of their marvelous medicinal excellence is due. The invaluable bromine was first discovered, in this country, in a mineral spring.

PLAN OF Congress Park, SARATOGA.

References.

- 1 Music Platform.
- 2 Reservoir.
- 3 Drinking Fountain.
- 4 Columbian Spring.
- 5 Music Pavilion.
- 6 Vase.



CLASSIFIED TABLE OF ANALYSES OF SARATOGA MINERAL WATERS.

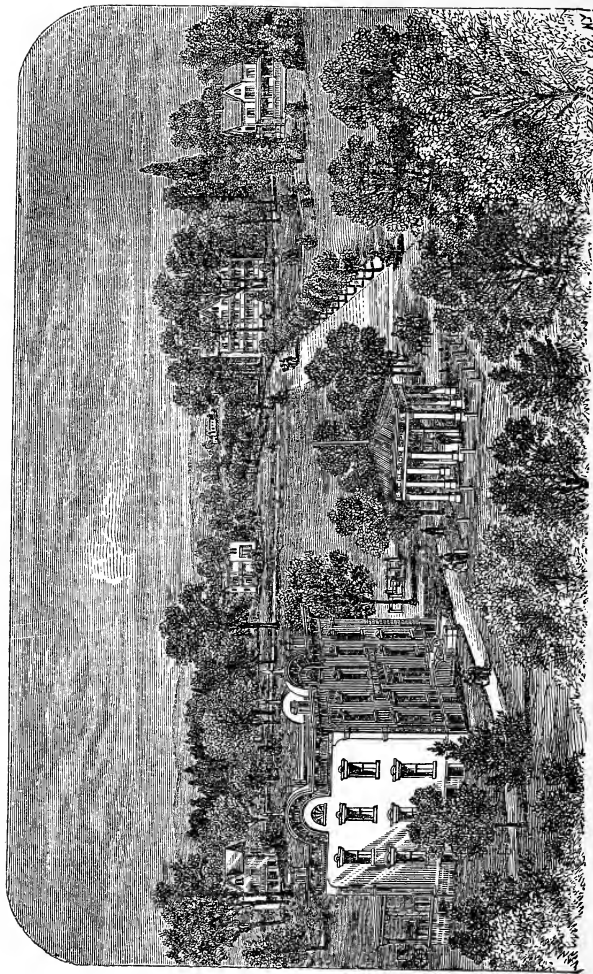
	MURIATED CATHARTIC WATERS.					ALTERATIVE AND DIURETIC WATERS.				
	Champion. Chandler.	Congress. Chandler.	Geyser. Chandler.	Excelsior * and Union. Chandler.	Hathorn. Chandler.	Crystal. Chandler.	Empire. Chandler.	High Rock. Chandler.	Red. Appleton.	Star. Chandler.
In EACH U. S. GALLON OF 231 CUBIC INCHES.										
Chloride of sodium.....	702.239	400.444	562.080	*458.299	509.968	328.468	506.630	390.127	83.530	398.361
“ potassium.....	40.445	8.049	42.634	8.733	9.597	8.327	4.295	8.974	6.587	9.695
Bromide of sodium.....	3.579	8.559	2.212	1.307	1.534	.414	.266	.731	.....	.571
Iodide “.....	.234	.138	....248	.039	.198	.066	.006	.086	.....	.126
Fluoride of calcium.....	Trace.	Trace.	Trace.	Trace.	Trace.	Trace.	Trace.	Trace.	.....	Trace.
Bicarbonate of lithia.....	6.247	4.761	9.004	2.605	11.447	4.326	2.080	1.967	....242	1.586
“ soda.....	17.624	10.775	71.233	17.010	4.288	10.064	9.022	34.888	15.327	12.662
“ magnesias.....	193.912	121.757	149.343	109.685	176.463	75.161	42.953	54.924	42.413	61.912
“ lime.....	227.070	143.399	168.392	96.703	170.646	101.881	109.656	131.739	101.256	124.459
“ strontia.....	.082	Trace.	.425	Trace.	Trace.	Trace.	Trace.	Trace.	.....	Trace.
“ baryta.....	2.083	.928	2.014	1.703	1.737	.726	.075	.494	.....	.096
“ iron.....	.647	.340	.979	.269	1.128	2.038	.793	1.478	.....	1.213
Sulphate of potassa.....	.252	.889	.318	1.818	Trace.	2.158	2.769	1.608	.....	5.400
Phosphate of soda.....	.010	.016	Trace.	.026	.006	.609	.023	Trace.	Trace.	Trace.
Biborate “.....	Trace.	Trace.	Trace.	Trace.	.131	.305	.418	Trace.	.....	Trace.
Alumina.....	.458	Trace.	Trace.	.324	1.260	3.213	1.145	2.260	3.255	1.283
Silica.....	.699	.840	.665	2.653	Trace.	Trace.	Trace.	Trace.	.....	Trace.
Organic matter.....	Trace.	Trace.	Trace.	Trace.	Trace.	Trace.	Trace.	Trace.	.....	Trace.
Total.....	1195.582	700.895	991.546	701.174	888.403	537.155	680.436	630.500	254.710	617.367
Carbonic acid gas.....	465.468	392.289	454.082	384.969	375.747	317.452	344.669	409.458	.....	407.650
Density.....	.....	1.006	1.0120	.....	1.0115	1.006	.....	1.0092	.....	1.0091
Temperature.....	48°	52°	46°	48°	.....	45°	48°	52°	.....	52°

* The analysis of the Excelsior, although the better known of the two, is not given, as I consider it entirely unreliable. The water, however, is very effective.

CLASSIFIED TABLE OF ANALYSES OF SARATOGA MINERAL WATERS—(Continued.)

IN EACH U. S. GALLON OF 231 CUBIC INCHES.	MURIATED CHALYBEATE WATERS.						ALKALINE MURI- ATED WATERS.		SULPHUROUS AND SUL- PHURETED WATERS.
	Colum- bian. Steel.	Hamil- ton. Steel.	Pavilion. Chandler.	Putnam. Chilton.		Washing- ton. Steel.	Seltzer. Chandler.*	Vichy. Chandler.	
Chloride of sodium.....	267.000	297.300	459.903	214.000	281.500		134.291	128.689	There are three sulphu- rous springs near Saratoga. Two of them are fitted up Trace. Two of them are fitted up Trace. with comfortable and com- modious bath-houses. Dr. Steel mentions the "Sul- phur Springs of Saratoga" in his analysis of the min- eral waters, and states Trace. them to contain <i>sulphur</i> and <i>sulphureted hydrogen</i> , a small amount of <i>carbonic</i> <i>acid gas</i> , some <i>chloride of</i> <i>sodium</i> , and salts of <i>iron</i> and <i>lime</i> .
" " potassium.....	.....	.....	7.660	.....	.....		1.335	14.113
Bromide of sodium.....	.....	Trace.	.987	Trace.	.....		.630	.990
Iodide " ".....	2.560	3.000	.071	2.000	2.750		.031	Trace.	
Fluoride of calcium.....	.....	.....	Trace.	.....	.....		Trace.	Trace.
Bicarbonate of lithia.....	.....	.....	9.486	.....	.....		.899	1.760
" " soda.....	15.400	27.036	3.764	14.320	16.500		29.428	82.873	
" " magnesia.....	46.710	35.200	76.267	51.600	40.920		40.339	41.503	
" " lime.....	68.000	92.400	120.169	68.800	92.600		89.869	95.522	
" " strontia.....	.....	.....	Trace.	.....	.....		Trace.	Trace.
" " baryta.....	.....	.....	.875	.....	.....		Trace.	.593
" " iron.....	5.580	5.390	2.570	7.000	3.250		1.703	.052	
Sulphate of potassa.....	.....	.....	2.032	1.680	.....		.557	Trace.
Phosphate of soda.....	.....	.....	.007	.210	.....		Trace.	Trace.
Biborate " ".....	.....	.....	Trace.	.....	.....		Trace.	Trace.
Alumina.....	.....	.....	.329	.560	.....		.374	.473
Silica.....	2.050	.....	3.155	.840	1.500		2.561	.758
Organic matter.....	.....	.....	Trace.	.....	.....		.....	Trace.
Total.....	407.300	460.326	687.275	361.010	439.020		302.017	367.326	
Carbonic acid gas.....	272.060	316.000	332.458	348.000	262.500		324.080	383.071	
Density.....	1.0073	1.0085	1.0095	.....	1.0078		.....	.....
Temperature.....	50°	50°	.....	51°	50°		50°	50°

* Chandler's analyses are the only ones in which confidence can be placed, or which can be recommended as strictly accurate and reliable.



View of EXCELSIOR SPRING, and a portion of EXCELSIOR PARK.
SARATOGA SPRINGS, N. Y.

DISEASES FOR WHICH THE WATERS ARE USED.

DISORDERS OF STOMACH AND BOWELS, ETC.

(Gastro-intestinal Affections.)

IN DYSPEPSIA or INDIGESTION, of various forms, the mineral springs of Saratoga have secured a wide reputation. They exert an invigorating effect upon the stomach, and build up the appetite. By means of the cathartic waters the waste of the body is carried out of the system, and a new demand created for food and exercise. Effete matter is all the time accumulating in the body from the disintegration or breaking down of tissue. It is necessary for health that it should do so. The cathartic and alterative waters hasten this change in all the tissues of the physical frame, and the former act upon the bowels and all the excretions to remove the refuse matter.

Perhaps in the majority of cases of *dyspepsia* this variety of the waters—the cathartic—may prove the most useful; assuredly so, when, as is so often the case, the bowels are constipated, or the LIVER is DERANGED. When there is a certain amount of GASTRITIS (*inflammation of stomach*) or *gastric irritability*, the mild alterative or alkaline waters often prove curative, and are usually agreeable to take. They also set well, the carbonic acid gas mildly stimulating the mucous membrane of the stomach and giving it tone, as well as correcting any tendency to nausea.

In dyspepsia (LOSS or DERANGEMENT of APPETITE), alkaline waters have long ranked as almost specifics. The famous Vichy Springs of France have attained a world-wide renown in this class of cases. There are many doubting Thomases who

think the virtue of mineral waters in such cases is purely imaginative. This is not so. A recently discovered (Ringer) natural law perfectly explains the action. It has been found that acids check acid secretions, when locally applied, but increase those secretions which are alkaline. The reverse law holds good. Thus a mild alkali taken shortly before eating stimulates the acid secretion of the stomach (the gastric juice), and exerts a curative influence on DYSPEPSIAS (*atonic*) dependent upon a deficiency of these secretions.

The cathartic waters quicken all the processes of life, raise the spirits, and improve the health. The organs of digestion share in the general quickening. On the strength of a very eminent authority (National Dispensatory, Stille and Maisch) the stronger (*cathartic*) waters are "especially indicated in those forms of DYSPEPSIA which are attended with decomposition of food in the stomach, causing FLATULENCE, ACIDITY (*heart-burn*), and pain, and either diarrhoea as in children, or constipation as in adults." Such cases are frequently associated with PALPITATION as well as HEART-BURN (cardialgia), HEADACHE, DIPLOPIA (seeing double), HYPOCHONDRIASIS, etc., which are accordingly relieved. In simple ACIDITY—with or without eructations—with which so many are troubled, the alkaline waters are very useful, as well as in ACID DIARRHŒA and CATARRH of the INTESTINES. They have been spoken highly of in ULCER of the STOMACH (Niemeyer), and GASTRALGIA (pain in stomach).

Congress water has been often taken at sea to relieve SEASICKNESS, and not without accomplishing the desired end. Most of the milder waters are excellent in checking NAUSEA, alkalies having a sedative effect upon the stomach, and carbonic acid gas performing the useful function of restoring perturbed innervation.

In the use of the waters in dyspepsia it must be borne in mind that the bowels *must* be kept in good order, if it is expected that the trouble is to be cured. When they are regular,

the alkaline waters will suffice. The Geyser combines strong alkaline and cathartic properties; the Congress and Excelsior, a milder but very efficient impregnation—the former has long been a favorite in these complaints. For directions for using the different varieties of waters mentioned, see page 33.

CONSTIPATION or COSTIVENESS. It does not need the knowledge that 3,000 barrels of liver and purgative-pills are sold in this country yearly, to impress the fact that constipation is one of the greatest curses of the times, and one, too, which physicians too frequently confess themselves inadequate to cope with. Imagine the sanitary condition of a city with all the sewers choked ; with all the underground means of removing the refuse accumulations of a large population cut off. Imagine the poisonous and pestilential exhalations which must saturate the atmosphere and penetrate everywhere. And yet thousands and millions of our fellow-citizens are in about as healthy a condition, individually, as the illustration given. Is it any wonder that the vicarious work thrown upon kidneys, and lungs, and skin, are productive of numerous disorders and a high death-rate ? Or is it any wonder that we have distempered brains with the unsewered debris of the body coursing through their labyrinths ?

In CONSTIPATION, then, these waters have achieved some of their greatest results. They may be taken so as to produce a gentle natural movement or violent catharsis. Many people imagine that their chief benefit is attained when their greatest purgative effect is secured. When properly—that is not excessively, or at improper times—used, they are entirely free from danger, and do not cause griping or any disagreeable symptoms. Moreover, instead of debility and languor after a movement, there is usually a feeling of vigor and refreshment. On the contrary, when improperly used, they may produce severe colic and *diarrhœa*, with other untoward effects. Their use may be continued for years, with gradually diminished quantity, as a rule affording the most satisfactory results, with a general freedom from bil

iousness or tendency to serious indisposition. It is undoubtedly due to a gentle action (cholagogue) on the liver that this long adaptation is found practicable, for the stools retain a perfectly natural character. The bottled waters are quite as useful as when fresh from the spring, and produce quite as good results. In obstinate cases of constipation the stronger waters are demanded, but in many cases the milder are efficient and answer the purpose better. Each has its use. For special directions for using the waters, see page 33.

In HEMORRHOIDS (*piles*), occurring as the result of constipation, sedentary habits, hot rooms, and a stimulating diet, the gentle aperient action of the cathartic waters is found serviceable. It is difficult for piles to perpetuate themselves if the bowels are kept well regulated. They should not be taken to the point of producing loose and free passages; neither should the movements be of a hard or lumpy character.

The simple ABDOMINAL PLETHORA, or FULLNESS, frequently found in GOOD LIVERS, when the liver, spleen, and mesentery are distended with sluggishly moving blood, and the abdominal blood-vessels are likewise in an engorged condition, the action of the cathartic waters affords a prompt and grateful relief. Their action is peculiarly happy in those who are commonly termed FREE-LIVERS, or are inclined to OBESITY, and in these cases the more alkaline waters are preferable, as is also the case with those of SEDENTARY habits. Thus with free-livers the alkali tends to promote oxidation and diminution of bulk; with SEDENTS, who are almost always disturbed by acidity, it corrects that fault. In many cases the simple alkaline water accomplishes the desired end, but when a laxative water is demanded, as is usually the case, one strong in alkali (bicarbonate of sodium), such for instance as the Geyser or Congress, is best. This class of waters (alkaline) neutralize irritating acid secretions generally, and to a certain extent relieve a variety of morbid nervous phenomena, promoting sleep and tranquillity.

The same quality renders it valuable in ACID and NERVOUS DIARRHŒA. Catarrh of the stomach and bowels will be specially considered under another heading ; see Index of Diseases, p. 7.

DISORDERS OF LIVER AND SPLEEN, ETC.

(*Hepatic and Splenic Affections.*)

Dr. Steel, who carefully and scientifically examined the springs for many years, recorded as his opinion that none were more benefited than the "BILIOUS." That the cathartic (and some other) waters possess a true cholagogue (stimulating the flow of bile) action cannot be doubted, for the reasons enumerated in speaking of constipation. They work admirably in most functional diseases, and I have reason to believe, in some *organic diseases* of the *liver*. In 1872-3 Rohrig demonstrated that saline cathartics augmented the flow of bile ; and, in fact, many things causing a determination of blood to the liver. These waters are valuable in ACUTE and CHRONIC HEPATIC (*liver*) CONGESTION, but not, of course, in *hyperæmia* (fullness of blood) due to disease of the heart or lungs.

In JAUNDICE (*icterus*), whether depending upon CATARRH of the HEPATIC DUCTS (*gall-ducts*), BILIARY CALCULI (*gall-stones*), or CONGESTION of the LIVER, they are nearly equally valuable. They relieve the catarrh of the ducts, as well as GASTRO-HEPATIC CATARRH, and while there may be some doubt as to how much they dissolve the calculi, they certainly have greatly benefited such cases, and the GALL-STONES have been afterward found in the excrement. A medical authority says the saline evacuants are useful in such cases because they render the "bile more copious and liquid," and another physician, familiar with the action of Saratoga waters, speaks in almost the same words of their action on the liver, saying that they seem "to liquefy the bile, causing it to flow freely." A distinguished German writer

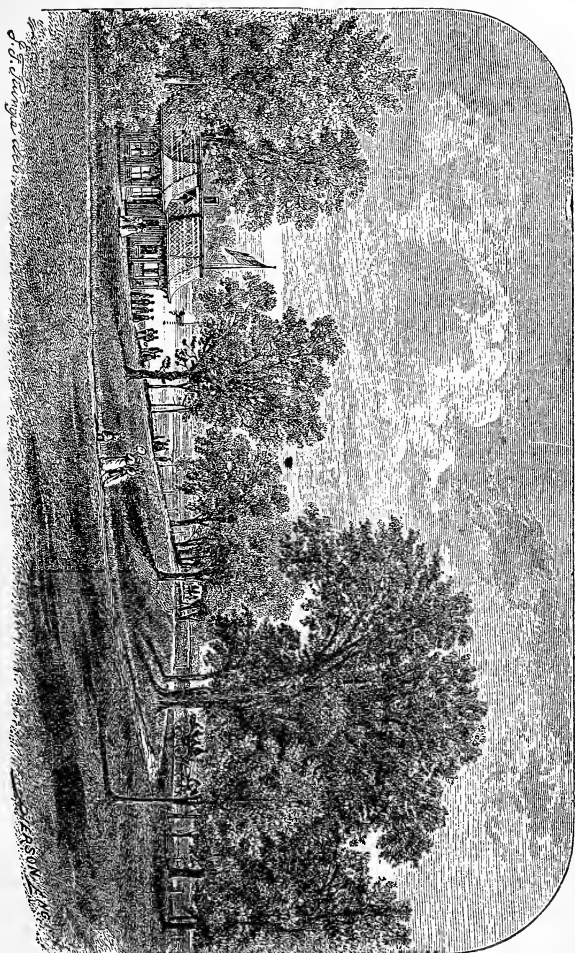
(Frerichs), in a recent work, speaking of other mineral springs, says: "These waters have certainly proved the most efficacious remedies against gall-stones. In many severe cases I have directed my patients to go to Carlsbad and they have returned cured." French physicians speak in the same terms of Vichy (France). The more alkaline waters are by far the best (the simple alkalies alone may be used) and rapidly remove the concretions; the bowels, should, however, be kept in proper condition by means of the cathartic waters, which are usually indicated in ordinary biliousness and always when the bowels are costive. For directions for using each kind of water, see page 33.

There can be no doubt of the excellence of the cathartic (and alkaline) waters in stimulating the LIVER in general DERANGEMENT and in some forms of ENLARGEMENT, even from MALARIAL CAUSES; as well as in CIRRHOSIS (*gin or hob-nailed liver*). Through their oxidizing influence they are also said to be of value in FATTY LIVER and FATTY DEGENERATIONS generally. They have also proved useful in ENLARGEMENT of the SPLEEN from MALARIA.

DISORDERS OF KIDNEYS AND BLADDER, ETC.

(*Nephritic and Cystic Affections.*)

In most forms of RENAL (KIDNEY) DISEASE it is best to leave the medicinal waters of Saratoga severely alone; especially in what is commonly called KIDNEY COMPLAINT, and in DROPSY, in which they have been most perniciously and criminally recommended. It is barely possible that in certain cases their use may be beneficial, but they are liable to do more harm than good, and the indiscriminate recommendation of them in such cases is very reprehensible. In BRIGHT'S DISEASE, or anasarca (*dropsy*) depending on DISEASE of the HEART or LUNGS, they are dangerous or useless, and always to be avoided. In PARTIAL



LAWN VIEW OF SARATOGA VICHY SPRING.

SUPPRESSION, from transitory causes, or in LITHIASIS (*stone or gravel*), they find an appropriate field for exhibition.

The Alkaline waters speedily relieve the effects of ACID URINE; such as the scalding pain which is so excruciating in CYSTITIS, GONORRHEA, etc. They often have a sedative effect in IRRITABLE BLADDER; that is, when the urine is not alkaline. The amount of the spring water required will depend somewhat on the acidity of the stomach, which neutralizes a portion of the alkali in the water. Care must be taken, however, not to render the URINE too ALKALINE, by imbibing too much of the water, lest it cause a precipitate of PHOSPHATE of LIME. Vichy water is recommended in GRAVEL (*red sand*) and in CYSTINE and OXALATE of LIME CALCULUS (stone). Its use, or that of any of the waters, is inadvisable in PHOSPHATIC or MULBERRY CALCULI (stones). Dr. W. Roberts, of Manchester, England, has shown that URIC ACID CALCULI (stone composed of red sand) may be dissolved in the BLADDER, *if the urine is maintained alkaline for some weeks*. The same holds true of RENAL CALCULUS or STONE in the KIDNEY. An alkaline treatment in the cases just instanced is absolutely the only hope medicinally, and the most competent and celebrated authorities unite in recommending such a course.

Among the urinary diseases in which Vichy water has been used with most gratifying results is DIABETES MELLITUS (*sugar in the urine*). As with its famous prototypes, the popular and well-known springs at Vichy, France, which have long been prominent in the treatment of this disease, very good results are reached. But while it frequently relieves the malady, it can seldom be considered to have cured it. It appears to restrain the production of glucose and oxidize the sugar. The Vichy seems best adapted to that form of diabetes in which the person is stout and obese, rather than thin and nervous. That great orthodox authority, the National Dispensatory says that "the usefulness of alkaline waters in diabetes does not admit of any doubt, however difficult it may be to explain their mode of action."

Persons afflicted with CATARRH of THE BLADDER (*cloudy urine*), often find the alkaline waters very beneficial, as they possess great power of dissolving THICK MUCUS and MUCUS ACCRETIONS. Quite as often, however, the alterative waters are indicated, particularly the Red Spring. Any of the iron, or alterative and diuretic waters, are useful in PARTIAL SUPPRESSION, or deficiency of freeness in passing urine, whether it be due to congestion or choking up of the renal tubules by mucus or casts, but should be used with care.

DISORDERS OF THE NERVOUS SYSTEM.

(*Cerebro-Spinal Affections.*)

IN CHRONIC CONGESTIONS of the BRAIN (*fullness of head, head plethora*) or cord, or their meninges (covering membranes), attended with constipation, the cathartic waters are often of immediate service. They relieve the blood pressure by draining off the superabundant serum (liquid portion) of the blood, without sacrificing its more vital elements, or exerting an irritating, heat-evolving influence. In these conditions of the head or spine the iron waters are to be strictly avoided. But in ANÆMIA of the BRAIN (lack of blood in brain) and in some forms of NEURASTHENIA (*nervous debility*) or BRAIN EXHAUSTION, unassociated with plethora of the head, the tonic waters do much good. In the first (*anæmia of brain*) a very free use of the waters (iron) is desirable. This class of waters is valuable in HYSTERIA, particularly when occurring in middle-aged females, and has been recommended in EPILEPSY and CHOREA, without probably being of much use.

The cooling or refrigerating action of the saline evacuants has long rendered them essential in the treatment of INFLAMMATORY and CONGESTIVE CONDITIONS generally, particularly to move the bowels in fevers, etc. The temperature is occasionally

reduced several degrees. The cathartic waters are frequently useful in cases of NERVOUS DEBILITY and IRRITABILITY, especially when associated with torpid liver, sluggish bowels, and a general inertia of the abdominal organs. In this affection with its attendant satellites, when free from the above-mentioned conditions, the alterative waters are often of great value, building up the general health with amazing rapidity. In such cases, as a tonic, "alteratives are sometimes better than iron." They also frequently prove useful in dispelling the indefinable MALAISE of body and mind which seizes upon people in delicate health.

In CONVULSIONS and other forms of nervous manifestation due to intestinal irritation, as from indigested food, etc., the cathartic waters may be used. Their alterative action, with free catharsis, sometimes exerts a very salutary influence in cases of MENTAL DEPRESSION or HYPOCHONDRIASIS; markedly so when connected with *biliousness, constipation, and indigestion*. There seems to be a sort of specific action in these cases, which often renders them of inestimable value. The intimate relations between biliousness or derangement of the liver and mental states must have been noticed by every observant physician. A well-known writer on nervous diseases says: "Every practitioner has seen the wonderful elation of spirits which follows a free movement of the bowels, after continued torpidity of the liver." The condition of the liver frequently offers an accurate barometrical index of the state of the mental atmosphere, whether hazy and dull, or clear. The alterative, as well as cathartic waters have been found useful in NEURALGIA and in ORDINARY and SICK HEADACHE, relieving cerebral blood tension and counteracting acidity, together with a general sedative influence.

DISORDERS OF THE SKIN AND MUCOUS MEMBRANES.

(Cutaneous and Catarrhal Affections.)

Cutaneous affections have long been treated at certain of these springs, frequently with great benefit. It is questionable whether even the sulphurous springs have any value in PARASITIC DISORDERS; and the other springs, of which the alterative and alkaline varieties are principally used in skin troubles, have assuredly little potency. However, in that other class of cutaneous affections largely dependent upon perversion of the nutrition of the skin, in which an alterative action is desirable and a change in the conditions of the tissues necessary, they each answer the purpose finely. In the treatment of ERUPTIVE AFFECTIONS the alterative and sulphur waters are principally used, and of these the former receives the largest share of patronage. The sulphur waters of Saratoga are not as well known as they should be, and their remarkable remedial virtues are not sufficiently recognized.

Of the alterative waters all are well known and have achieved fame; particularly is this the case with the Red Spring, High Rock, Empire, and Star Springs. In ECZEMA or SALT-RHEUM they have accomplished many remarkable cures, and have proven valuable in such scaly disorders as PSORIASIS and PITYRIASIS, and allied diseases. They have long been popular, especially the Red Spring, in *festeri*ng and *running sores*, *whitlows*, *boils*, and *felons*, as well as in INDOLENT, ILL-CONDITIONED ULCERS. In the latter trouble Dr. Steel recommended them very highly, and their depurant action is always observable wherever opportunity is afforded for its display. Excellent results have been attained in HERPES (commonly called *shingles* and *fever-sore*), LICHEN, IMPETIGO, ACNE (*pimples on face*), etc. It is in this class of cases and those first named, *eczema*, *psoriasis*, and *pityriasis*,

that the sulphurous waters find a field for their usefulness, and should not be neglected if the others fail. The sulphurous waters are used both internally and externally, see directions for using p. 37. In most cases, especially in *eczema* and *psoriasis*, care must be taken not to employ them externally until the subsidence of the acute stage, otherwise they will greatly aggravate the rash. "Obstinate forms of these skin diseases, rebellious to other treatment, often yield to sulphide baths" (Ringer).

The adaptation of the waters to so many kinds of skin disease may excite some remark or surprise in those who have never given it thought. As understanding the "whys and wherefores" of a subject is always desirable, especially when one's health is concerned, a word of explanation may be condoned. A medical writer (Hartshorne), in treating on the subject of skin diseases, says, "The most essential part of the treatment of chronic diseases of the skin is either alterative or antidotal. Parasitic affections, as scabies, favus, mentagra, etc., require the destruction of the epizoon or epiphyte (*parasite*) by an antidote. Others as *eczema*, lichen, impetigo, lepra, etc., when at all obstinate, are treated in the same manner essentially, to whichever class the disease may belong. . . . Any means which will hurry the removal of the old diseased skin and favor the immediate construction of a new layer will be curative, whether it be only soap, water, and frictions, mercurial ointment, vesication, or the actual cautery." Weak solutions of the sulphides (sulphur waters) strongly stimulate the skin, augment its blood-supply and act on the sweat-glands. Sulphureted hydrogen (gas from sulphur waters) likewise is a powerful cutaneous stimulant.

Reverting again to the alterative and alkaline springs, Dr. Fisk, who devoted his examinations, however, almost entirely to, one spring, says, "In some of the cutaneous diseases, those more especially dependent upon an acid state of the secretions, these mineral waters are beneficial, both from their alkaline properties

and their depurative effects." It is in precisely this class of cases that the alkaline variety of waters is called for; that is, in those depending upon *acid secretions* (as ACID PERSPIRATION) and an acid state of the system. Locally these waters may be applied to control the weeping surface of SCABIES, ECZEMA, etc. They will also, frequently, lessen the DISCHARGE of ULCERS.

Mineral baths are an absolute necessity in testing the value of the spring waters in skin diseases. From their alkaline reaction (the sulphur waters *only* are slightly acid; all the others are alkaline), they are soothing and curative, relieving the intolerable ITCHING, and removing the *incrustations* which have accumulated upon the surface. The internal exhibition of the waters greatly augments the favorable progress of the malady by correcting alimentary (stomach and bowels) derangements and promoting the general health.

In CATARRHAL INFLAMMATIONS the alterative and diuretic, as well as alkaline waters, accomplish excellent results and cure many obstinate cases. They appear to exert an alterative and tonic, and in the case of the iron waters, a slightly astringent influence upon the mucous membranes of the body, whether applied locally or taken internally. The effect is, however, much the stronger in the former instance, and seems then to have a sedative influence on the low grade of inflammation which is always going on in catarrhs. They also liquefy the DISCHARGES and cleanse the surface, counteracting acidity and destroying irritating influences. Their action upon mucous membranes is peculiarly efficacious in CATARRH of the STOMACH, also when associated with CATARRH of the GALL-DUCTS (*gastro-hepatic catarrh*); the cause of a form of dyspepsia particularly troublesome and obstinate. The alterative waters usually answer best in this class of cases (see directions for using waters, p. 33), and set well on the stomach; the pungent stimulating effect of the carbonic acid being very agreeable—relieving any tendency to nausea. The salt in the waters destroys the germs of ferment-

tation which are liable to develop in this condition of the digestive organs.

They are likewise beneficial in CATARRH of the INTESTINES (white, slimy *discharges* from bowels), as well as VAGINA and UTERUS. In the last two, and in OPTHALMIA (inflammation of the eye), and NASAL CATARRH, the water—the Red Spring being among the best in most of these cases—should be applied locally from once to two or three times daily, in addition to its internal administration. In CATARRH of the BLADDER, and IRRITABLE BLADDER, the iron waters are awarded special efficacy. It has long been held that a specific effect is exerted on the mucous membrane in this region by ferruginous agents. The alterative waters are also good, and have been recommended in CATARRH of the LARYNX; an affection very troublesome to public speakers and singers.

CONSTITUTIONAL DISORDERS.

(Diathetic and Morbid Systemic Affections.)

The springs have attained considerable reputation in the treatment of SCROFULA, and all the affections commonly associated with it. A combination of the alterative and iron waters produces the happiest results usually, although some, as the Red Spring, have single-handed achieved remarkable triumphs. The Red Spring may be compared to the wonderful Carlsbad, of Europe. Both springs have performed marvelous cures, and are comparatively weak waters, nor can their virtues be ascribed to any particular ingredient. They are likewise used in much the same class of cases. The German Pfeffers and Wildbad have but an insignificant mineral impregnation, but have accomplished a reputation which is world-wide. The celebrated Kissingen is almost identical with the Saratoga Crystal spring, substituting the sulphate for the carbonate of magnesia. With



ENTRANCE TO CONGRESS SPRING PARK,
Monument Square.

the same proviso it also resembles the Pavilion, which, however, has more iron in it. The Saratoga Seltzer presents an analysis strikingly like that of the German Nassau Seltzer, but is much more brisk and sparkling, from having more carbonic acid gas. Many of the best American springs, however, as the Congress, Geyser, Hathorn, Star, and Empire have no European analogues.

In all forms of SCROFULA the iron or alterative waters are useful. Iron and iodine, and lime, indeed, make an ideal prescription for that affection, and that is what these waters contain, kindly compounded by nature in her vast subterranean laboratories. The same qualities make them useful in RICKETS, or softening of the bones in childhood; also in MOLLITES OSSEUM, the same affection in maturity. Whether the scrofula affects the bones, as just cited, or the skin, or the glands, as is frequently the case, the waters may be recommended as worthy of a trial. Speedy results cannot be expected in such cases, or indeed in most constitutional or chronic diseases.

In all LIME-STARVED subjects, as in the dwellers of cities and others, both the tonic and alterative waters are exceedingly useful. The great difficulty in introducing lime salts into the system has been their insolubility, which prevented assimilation. In these waters, which are loaded with the bicarbonate of lime, they are in a state of perfect solution, and moreover do not in the least irritate the most delicate stomach. In all forms of *scrofula* and *anæmia*, the Vichy and the strong alkaline waters are contra-indicated, and should never be used.

In *poverty of the blood*, when its composition is much altered, as in ANÆMIA, HYPNOSIS (*thinness of blood*), etc., the above named waters (iron and alterative), may do much good by supplying natural and essential constituents of the body, which are deficient or lacking. True anæmia is always characterized by DEBILITY, of which it is the most constant attendant. To this, iron is as food to the starving. There is met the old shibboleth of complaining—non-assimilation. The alimentary canal

seems to lack the power of taking up the iron, which is as plentiful as ever in the food, perhaps. Thus it is not deficiency of iron in the aliment (food), but inability to seize and possess it, which distinguishes many cases of anæmia. The iron waters are adapted to all forms of this affection, from *whatever cause*,* and are to be used unless contra-indicated for other reasons, for which see p. 38.

In anæmia associated with the CONVALESCENCE from *fevers*, and in the YOUNG and (*pains*) GROWING, in CITY PEOPLE and SEDENTS, and in CHRONIC MALARIA, it is the constant Mecca to which the ailment bows. Of its use in the latter affection a well-known writer remarks: "Iron is of remarkable value in *chronic malaria*, which is always attended with destruction of blood-corpuscles, pigment liver, etc." Iron forms nearly one-third part of the ashes of red blood-corpuscles, or disks and tends to increase their number very rapidly. These little bodies, less than $\frac{1}{3000}$ of an inch in diameter, give color to the blood and the ruddy tinge to the cheek. They are the vital part of the blood, which is the life of the body. Iron, then, is a tonic because it is a food to one of the most important elements of our frame.

From this it will be seen that when the anæmia arises from drains upon the system, the tonic waters repair the damage by building up the blood. The alterative waters do this in another way by stimulating digestion and all the functions of the body. Thus, in such drains as are peculiar to females, as MENORRHAGIA, LEUCORRHŒA, CHLOROSIS, NURSING, etc., they (the tonic waters preferably, in all cases of anæmia where they can be taken) are imperatively demanded. Also in certain diseases when resulting from anæmia, as AMENORRHŒA and DYSMENORRHŒA, likewise in STERILITY arising from the same cause, they are oftentimes curative. In *leucorrhœa* they appear to lessen

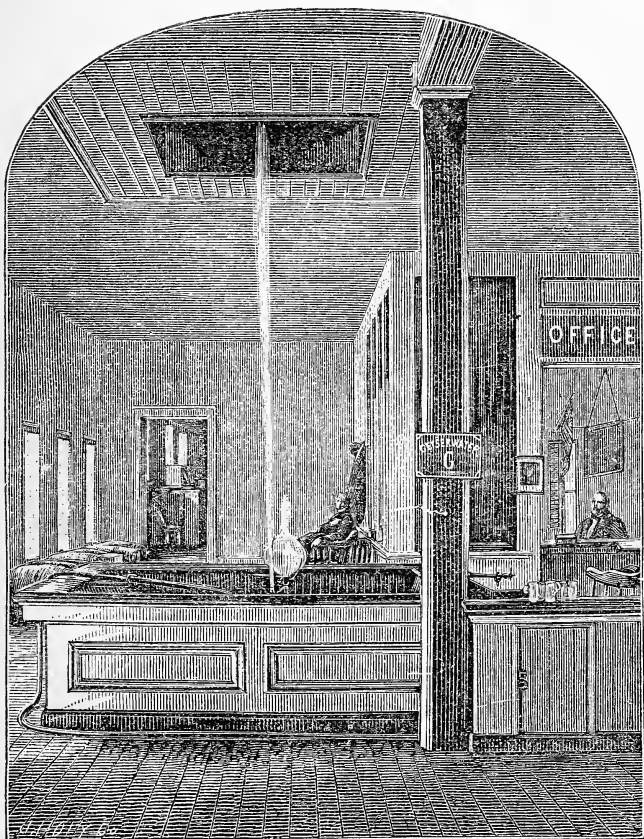
* When the anæmia depends upon CANCER, GRAY KIDNEY, MORBIS CORDIS. etc., the treatment is acknowledged palliative only.

the discharge when taken internally, doubtless partly by giving tone to the parts. The same is observed when topically applied.*

In FLUXES or HEMORRHAGES of all kinds, whether from the BOWELS, LUNGS, NOSE, UTERUS, or from PILES, etc., they are valuable in restoring the impoverished blood to its normal condition. In the second instance a more astringent form of iron is usually desirable. Whenever the state of the blood is below par, it may be from indefinable causes, the efficacy of this variety of waters is pronounced. In ANÆMIA of the BRAIN, relief or cure is often accomplished by taking the iron waters in larger quantities than usual. It is, in fact, one of the best possible modes of treatment.

RHEUMATISM.—As far back as the venerable traditions of the springs extend they had a reputation among the aborigines for the cure of *rheumatism*. This reputation has been perpetuated, and many have found relief through the medicinal properties of the waters in this affection. At present one of the most useful waters in the treatment of rheumatism, is the Vichy, a strong alkaline water, which will neutralize the acid in the system, which constitutes the disease. Very frequently constipation is associated, and the Geyser is the best cathartic, for that is by far the strongest in alkali among the laxative waters, as will be seen by reference to the table of analyses. In fact, the latter will be the more generally used water in that affection, because it stimulates all the excretive glands of the body much more than the first mentioned, and because of the great prevalence of costiveness. The Congress is also a favorite and extremely valuable. In some cases the sulphurous waters are productive of better results, but, as a rule, the other waters should be tried first. The sulphurous waters should be used in chronic cases, and seem especially applicable to those in which the muscles and tendons rather than the joints are affected. In addition

* Alkali to alkali ; see law cited, p. 16.



GEYSER SPRING, SARATOGA SPRINGS, N. Y.

to internal use, hot sulphur-water baths should always be used in this disease. They are much more operative and effectual than the simple drinking of the water.

The alkaline waters are valuable in both CHRONIC and ACUTE RHEUMATISM. In ACUTE ARTICULAR RHEUMATISM, where many joints are involved and there is a high fever, acid sweats, and urine which deposits, an alkali is of great and immediate service. External applications should be made by means of swathing the affected limb or limbs in cloths saturated with the water. The water should also be taken internally.

In GOUT, the remarks made concerning the use of the sulphurous waters in rheumatism also applies. They are frequently just the thing, and nothing else does as well. Of the other mineral waters, the Hathorn is one of the best,—the lithia which it contains indicating its use in this affection, and the effects justifying the confidence placed in it. After the Hathorn spring the alkaline waters rank next in point of value. One or two glasses of Hathorn give the usual medicinal dose of lithia. The spring possesses about one-half the quantity of this drug which the strongest known lithia water—that of Wheel-Clifford, England—is said to contain. Some excellent results are reported with certain of the alterative waters—conspicuously the old High-Rock.

MISCELLANEOUS DISORDERS.

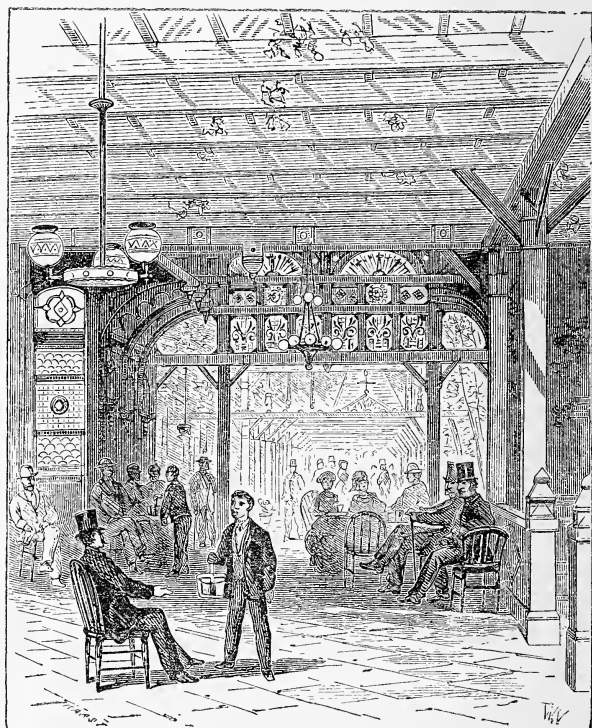
But little remains to be spoken of under this heading. In most CHRONIC NON-MALIGNANT DISEASES, which have resisted everything else, the alterative and diuretic waters are safe to try as a *dernier ressort*. Not infrequently they accomplish almost miraculous cures. In a GENERAL DEBILITY and FEEBLENESS, without any determinate cause, the same class of waters are often valuable, combined, when necessary, with a course at the tonic or cathartic springs. They seem to touch the secret springs of life and start the machinery afresh. It must not be

forgotten that they are food as well as medicine, and offer nearly all the constituents of the body; in some instances, as the Congress, bearing a striking resemblance to the serum of the blood in their composition. Perhaps no water is more agreeable or useful than the Congress in general weakness and slow convalescence, combined, when necessary, with the iron springs.

As a PROPHYLACTIC, or preventive of disease, the spring waters possess great value—especially the laxative waters. They keep all the channels of exit from the body open, and the system up to par. They are of great efficacy in warm climates in warding off DYSENTERIES, and GASTRIC and BILIOUS FEVERS, and invigorate the body generally.

The Vichy water checks the effects of STUFFING and HIGH LIVING, and relieves the *acidity* engendered through lack of exercise. It must be remembered that alkalies, as bicarbonate of sodium, tend to depreciate the vital forces and “impoverish the blood” (National Dispensatory), and so should not be much used in thin, anæmic subjects, except to correct acidity or indigestion, when the quantity required is usually small. The chloride of sodium in the Saratoga waters largely counteracts this tendency, and makes them safe. The chloride of sodium is found but very little in most of the foreign waters.

The stronger spring waters are good *antidotes* (where magnesia is demanded or an alkali needed), as in POISONING from the *mineral acids*, *oxalic acid*, *baryta salts*, *arsenic* and *zinc salts*, *nitrate of silver*, etc. They also neutralize the POISON of *insects' bites*, or of *poison vines*. They should in the latter instances be immediately applied to the part, which should be kept constantly moistened until the pain and inflammation subside, or the signs of the poison disappear.



INTERIOR OF CONGRESS SPRING PAVILION.

DIRECTIONS FOR USING THE WATERS.*

I.—CATHARTIC, OR SALINE LAXATIVE WATERS.

Most valuable cathartic springs.—Champion, Geyser, Hathorn, Congress, Excelsior, and Union. They are named in the order of their greatest cathartic strength and mineral impregnation, as shown by their analyses. The milder waters are frequently more useful and better borne than those with a stronger impregnation. Personal experiment, guided by the directions in the preceding pages, will show the water best adapted to each individual case.

Waters of this class are used in CONSTIPATION, DYSPEPSIA, HEMORRHOIDS (*piles*), ACIDITY, PLETHORA, BILIOUSNESS, CHRONIC CONGESTION OF BRAIN OR CORD, NEURASTHENIA, DEPRESSION, RHEUMATISM, GOUT, and slow CONVALESCENCE FROM FEVERS, and many LIVER AFFECTIONS, etc.

Administration.—The DOSE of the above-mentioned cathartic waters is from one to three or more glasses, to produce an action on the bowels. One or two glasses are usually sufficient. The Champion is the strongest water, and its dose is smaller than that of the others. The quantity can usually be diminished after taking for some time, and is often reduced one-half after the lapse of months or years. A dram or two of Epsom salts, or a dose of blue pill, with the first draught, is sometimes necessary to render the waters operative.

* It is not attempted to state how long it is necessary to use the waters in each disease; it would be impossible to do that. If improvement occurs, persist while it continues. If the waters do not seem to agree, consult a competent physician, or desist from their use.

The efficacy of the waters is much increased by warming, which promotes a more rapid absorption and unity of action. If not warmed, a walk or interval of ten minutes or so, in weakly persons, between glasses, hastens assimilation and avoids the ill effects of taking so large a quantity of cold water into the stomach at once. If taken from a bottle, the temperature of the room over night answers the purpose very well. When kept in a bottle, however warmed, the cork should always be left in until wanted for use, as its withdrawal allows the escape of gas, and the water becomes flat, and to some nauseating.

The *time* to take the cathartic waters is always before breakfast; at least twenty minutes or half an hour—longer if convenient. If taken too near, its cathartic effect is diminished, and the alkali may interfere with digestion. Sometimes a hot cup of coffee increases the effect. For directions when these waters are *not* to be used, see p. 38.

II.—ALTERATIVE AND DIURETIC WATERS.

Most valuable alterative springs.—Red, Star, Empire, High Rock, and Crystal, and many of the others, especially those containing iron. For more definite information the reader is referred to the chapter on diseases.

Waters of this class are used in SCROFULA and ALLIED AFFECTIONS, as RICKETS, etc.; in ANÆMIA and DEBILITY; in many SKIN DISEASES, as ECZEMA (salt rheum), HERPES (shingles), etc.; in *ill-conditioned* SORES; in CATARRHS of NOSE, STOMACH, GALL-DUCTS, BOWELS, etc. They are also used in many CHRONIC NON-MALIGNANT MALADIES.

Administration.—The DOSE of these waters *as an alterative* is from one-fourth to one glass, varying with the individual, three or four times a day. Some people are more easily operated on than others, and an entire glass may act principally on the kidneys, which is not desirable. In such cases the smaller doses are

requisite. In very large doses the waters purge, and the alterative effect is least when the bowels or kidneys are acted upon. The dose *as a diuretic* is from one to two glasses, two or three times daily. The dose of the Red Spring, from its being weak, is one-third or one-half more, or even double that of the other waters of this class.

Time.—Alterative waters are best taken fifteen minutes to half an hour before eating; if taken after eating, two or three hours, at least, should elapse before they are used. Bed-time is a good time to take them for either alterative or diuretic effect.

III.—IRON (TONIC), OR SALINE CHALYBEATE WATERS.

Most valuable iron springs.—Columbian, Washington, Putnam, Hamilton, and Pavilion. The springs are mentioned in the order of their estimated therapeutic worth; the strongest (not as per analysis) first. An infinitesimally small quantity of iron in a mineral water possesses more value medicinally than ten grains of the drug administered according to the pharmacopœia. Care must be taken in using the stronger waters, lest headache or constipation result. Also, see contra-indications, p. 38.

Waters of this class are used in ANÆMIA, by whatever cause produced, as HEMORRHAGE, LEUCORRHŒA, NURSING, CHLOROSIS, MALARIA, or the CONVALESCENCE from *acute attacks*, or in the YOUNG and GROWING. They are also useful in SCROFULA, and CATARRHAL AFFECTIONS, ACID DIARRHŒA, and in some forms of NEURALGIA and NERVOUS EXHAUSTION. In almost all cases of GENERAL DEBILITY these waters are permissible and invaluable.

Administration.—The DOSE of the saline chalybeate waters varies greatly with the individual. In many, small amounts produce intense headache and confine the bowels. In others, large quantities are imbibed without any unfavorable results. The dose of the stronger waters is ordinarily from one-fourth to one glass two or three times a day. In exceptional cases, as in cere-

bral anæmia, much larger quantities are of therapeutic worth. As the iron waters do not bottle well, the iron precipitating as soon as exposed to the air, they are best drank at the spring ; and from their constipating effect, with the majority of people, it is usually well to take the cathartic waters while using them.

The *time* to drink the iron waters is a short time before eating, or just after. In this way the tendency to vertigo and headache is usually obviated. At bed-time they answer well, but are liable to produce wakefulness. Shortly before meals, say fifteen or more minutes, is the best time to promote appetite and digestion.

IV.—ALKALI, OR ALKALINE SALINE WATERS.

Most valuable alkaline springs.—There are but two deserving to be exclusively ranked as alkaline : the Vichy and Seltzer. The Vichy has the advantage over foreign alkaline waters of holding considerable chloride of sodium in its composition ; an element which counteracts much of the depressing and impoverishing effect observable after long-continued use of other waters of this class. The Seltzer is almost identical with the famous Nassau Seltzer.

Waters of this class are used in DYSPEPSIA, ACIDITY, and HEARTBURN, PALPITATION, HEADACHE, GASTRITIS, JAUNDICE, GALL-STONES, CALCULUS OR STONE, and GRAVEL, DIABETES, OBESITY, and FREE-LIVING ; also in CUTANEOUS DISEASES, etc. Their use is contraindicated in anæmia and scrofula. .

Administration.—The DOSE of the Vichy for acidity, is part of a glass, repeated as necessary. For constitutional effects, a number of glasses—say three or four, or more—daily ; the number limited somewhat by the condition of the urine, it being desirable to avoid making it too alkaline, especially in cases of phosphatic calculus. The Seltzer is a table water, and its dose is not limited.

The *time* to take the Vichy for acidity is when the annoyance arises ; being only palliative. When taken for general effect, the best time is about half an hour before eating, and at bed-time. It is usually considered a pleasant beverage.

V.—SULPHUR, OR SULPHUROUS AND SULPHURETED WATERS.

Most valuable sulphur springs.—Of the three sulphurous springs near Saratoga, two are fitted up with bathing facilities, and each is known as “The White Sulphur Spring.” One is at the lake and the other north of the village. There are stages running to either of the springs ; the one at the lake connecting with a very pleasant steamboat excursion. While these waters are not as strong as many others in the United States, they are pure and valuable in many maladies, and doubtless will become better known and appreciated.

Waters of this class are used in many CHRONIC SKIN DISEASES, RHEUMATISM, NEURALGIA, CATARRH, GOUT, etc. For more particular uses, see the part devoted to the consideration of diseases.

Administration.—The waters are used principally in the form of *baths*. These are usually taken in the morning, and as often as every day ; sometimes but once or twice a week, according to the indications of the case. Daily or alternate days usually yield the best results. For rheumatism, gout, and some skin diseases, thermal (hot) baths are greatly to be preferred. When used internally, six or eight glasses of water may be taken daily between meals.

CONTRA-INDICATIONS, OR WHEN THE WATERS SHOULD NOT BE USED.

First.—The waters are unadvisable in CONFIRMED CONSUMPTION (*tubercles tuberculosis*), advanced BRIGHT'S DISEASE (*or dropsy*), and in all MALIGNANT DISEASES, as CANCER, etc. The latter is a general axiom in hydrology. The climate is good for consumptives, and those suffering from advanced disease of the kidneys, but the waters are not.

Second.—In a less emphatic degree the waters are unadvisable in ORGANIC DISEASE of the HEART and GREAT VESSELS, in TENDENCY to CEREBRAL DISEASE, and in all cases of ACUTE INFLAMMATION, or EXACERBATION of CHRONIC AFFECTIONS, or in PHOSPHATIC URINE.

Third.—As a rule the waters should not be much partaken of at, or within two or three hours after, meals. *Mixing of drinks** and taking too large a quantity should be carefully avoided, as it may produce *emesis*, "*pain in the back, hæmaturia (bloody urine), muscular prostration, a coated tongue, and loss of appetite.*"

Fourth.—Care should be taken in using the *cathartic* and *diuretic waters* when suffering from cold or much fatigue. The *iron waters* should be cautiously used in tendency to *cerebral hyperæmia (blood to the head)*, and *constipation* or *idiosyncrasy*. *Alkaline waters* are contra-indicated in *anæmia, scorbutis, scrofula, albuminaria*, etc.

NOTE.—Iron waters are frequently taken just after eating, on account of there being less likelihood of creating headache at such times; alkaline waters just after eating, to relieve acidity. Exercise should be taken in the open air when practicable, while using the waters, and in winter very warm clothing should be worn.

* Mixing spring waters before using is practiced at some European watering places, but is not advised here. Promiscuous drinking is strictly to be condemned.

PART SECOND.

HISTORY OF THE SPRINGS.

THE first personal knowledge possessed by the white race of these now famous springs was in 1767, when Sir William Johnson, well-known in colonial history, was brought from Schenectady on a litter, under the guidance of some Mohawk Indians, to test the medicinal virtues of the waters. He was accompanied by a Scotchman named McDonald, who had built himself a rude cabin on the borders of Ballston Lake. There is a tradition of a previous visit by a French officer, but to Sir William is usually awarded the honor of being the first white man to partake of the mineral waters of Se-rach-ta-gue.

To the aborigines these waters must have been known from a very remote period. It is said that the High Rock Spring was known to the Iroquois Indians at the time of Jacques Cartier's visit to the St. Lawrence, in 1535. The country about the springs originally belonged to the Mohawk Tribe, and was a rich and profitable hunting-ground. The spring constituted a great "salt-lick," and attracted the wild animals in large numbers; the love of the salty waters rendering the timid moose and deer so fearless of the presence of man that they were frequently killed by the Indians while drinking at the pool. Its geological formation indicates an extreme antiquity—certainly extending back thousands of years, even beyond the dim tradi-

tions of the red man, when its only patrons were the wild beasts that prowled through the primeval forests.*

The name Saratoga is supposed to be derived from the Indian word "Se-rach-ta-gue,"—meaning "the hillside country of the great river," and was first applied to that territory more contiguous to the banks of the Hudson. Subsequently it migrated westward and became known as the Springs of, or near, Saratoga. The first log cabin was erected in 1773—the first rude hotel in 1774, and from these small beginnings, in a little more than one hundred years, has sprung up, as if at the touch of a magician's wand, the great watering-place, with its splendid equipments, such as we find to-day.

The High Rock Spring, which bubbles up through a rocky cone, $3\frac{1}{2}$ feet high by $23\frac{1}{2}$ feet in circumference, and weighing 8 tons, is the most ancient of the group of springs at Saratoga, although another, called in contra-distinction the Flat Rock, was also known to exist at the time of the visit of Sir William Johnson. Its surface exit, however, was through numerous clefts and basins in the hard deposit, which had given it its name, and it also escaped in the surrounding marsh. It was therefore difficult to be utilized and attracted little attention.

The old Red Spring was discovered shortly after the Revolution, and in 1792, Congress Spring, so named in honor of the Continental Congress, was also discovered. The discovery of others followed in more or less rapid succession. The Columbian was tubed in 1805, and the Washington, or Champagne Spring, as it is sometimes called, from its sparkling qualities, in 1806. The ten springs were found in 1814; these include the Excelsior and Union Springs, which were not tubed until 1859 and 1868, respectively. The Pavilion Spring was brought to notice in 1836,

* An interesting treatise on this spring and its probable age is found in a publication by Henry McGuier, entitled, "A Concise History of High Rock Spring," 1868.

and the Empire, or New Congress, in 1846. The Hathorn, was discovered in 1868, and tubed in 1872. Since that time I am not aware of any new springs having been found, except the remarkable series of Geysers, situated one and a half miles south of the village, and reached by deep boring through solid rock. It has not been attempted to enumerate all the springs in the village in this space, as there are over thirty, and it would be a valueless task. The principal ones are sufficient to form an idea of the date of their discovery and recentness of their utilization.

The spouting springs, to which reference has been made, were brought into existence and notice during and since 1870. One of the principal ones, "The Geyser," was reached by boring an opening, $5\frac{1}{2}$ inches in diameter, 132 feet through the rock. So great is the evolution of carbonic acid gas that the water constantly spouts some 25 or 30 feet perpendicularly into the air. The Champion, not far distant, discovered in 1871, was found at a depth of 300 feet, and spouts through a two-inch nozzle to the height of 80 or 100 feet. It presents a mass of snowy foam, mantled with rainbow tints, as it falls to the ground. The mineral impregnation of this water is so great that a rapid incrustation of lime occurs on whatever is placed within reach of its spray. The Vichy, a fine alkaline spring, was found in 1872, after drilling 180 feet through the rock. It is situated on the very edge of Geyser Lake. The Triton, near by, was reached at a depth of 192 feet. The foregoing will be found to comprise a brief history of the springs, with the dates of many of their discoveries.



HIGH ROCK SPRING, 1767.—Visit of Sir Wm. Johnson.

JOHN KARSTEN.

BIBLIOGRAPHY, OR LITERATURE OF THE SPRINGS.

THE history of the medical papers and treatises on the mineral waters of Saratoga, may be very quickly given. It is curious how little of any real value has been written. Very little of careful, analytical study has been given to their consideration; indeed, the same may be safely asserted of mineral springs in general, notwithstanding the large share of public attention which they have always received.

The first physician to settle in Saratoga was Dr. Blakesley, in 1789, but he does not appear to have written anything. Dr. Constable, of Schenectady, in 1770, also examined the waters, and with like result. The first publication of which I can find record was a letter to Dr. Joshua Fisher, of Boston, written by a regimental surgeon, named Samuel Tenney, after a visit here in 1783, which was published in the "Memoirs of the American Academy of Arts and Sciences," vol. ii., part 1, 1793. The venerable Samuel Mitchell, LL.D., also records a visit to the springs in 1787, and investigations with reference to the escaping gas, which he denominated "fixed air," and recorded as possessing the power of extinguishing flame and destroying all animal life.

The first really scientific examination of the waters was published in 1793, in a work entitled "A Dissertation on the Mineral Waters of Saratoga," by Valentine Seaman, M.D., a then noted physician, and one of the surgeons of the New York Hospital. His investigations, however, were almost entirely confined to one spring—the High Rock. From that time until Dr. Steel wrote his first observations on the medicinal springs of Saratoga and Ballston, in 1817, there does not appear to have been anything published, with the exception of a graduating

thesis by J. Meeker, in 1815. In 1817, the same year that Dr. Steel first issued his writings on this subject, Dr. Wm. Meade published a work entitled "An Experimental Inquiry into the Chemical Properties and Medicinal Qualities of the Principal Mineral Waters of Ballston and Saratoga." In 1829, it is said, Dr. Tristram wrote concerning the springs and demonstrated the presence of iron in them. Dr. Steel had done this previously. To Dr. A. A. Hayes, of New Haven, is due the credit of having first shown them to contain bromine and potash, which he announced in the *American Journal of Science*, July, 1830. Dr. Steel discovered the existence of iodine in 1828.

In 1831 the first and only book possessing marked original merit, devoted to the Saratoga springs, was issued. It was entitled "Steel's Analysis," and was the result of prolonged observation and patient and careful experimentation. A second edition of the book was issued in 1838, after a partial revision by its author, who died the same year. The same work was again revised and reissued by the late Dr. Perry, of Saratoga. M. L. North, M.D., published "Saratoga Waters; or, The Invalid at Saratoga," in 1841; also "North's Guide for Invalids," in 1846. A somewhat more pretentious book was issued in 1844, by Dr. R. L. Allen, a resident physician, the title of which was, "A Historical, Chemical, and Therapeutical Analysis of the Principal Mineral Fountains at Saratoga Springs." It was accompanied by directions for their use, and two subsequent editions were issued in 1848 and 1853. Five years later a similar book, more general in its character, was issued by the same author. N. Bedortha, M.D., was the next to prepare a work on the waters. It appeared in 1860, and was called "Practical Medication; or, The Invalid's Guide." Since then contributions have been made to the literature of the springs by many writers, among them Professors Emmons and McGuier, W. L. Stone (1866), G. H. Bates (1868), and R. F. Dearborn.

Many communications to learned societies have also been

made, although but little has been contributed to the general fund of knowledge relating to the properties of the waters. A chapter in Moorman's "Mineral Springs of North America," and Walton's "Mineral Springs of the United States and Canada," is devoted to their consideration, as well as an occasional space in similar volumes. Most of these observations are, however, simply chemical in their nature and in regard to the physical properties of the waters.

SOURCE OF THE SPRINGS,

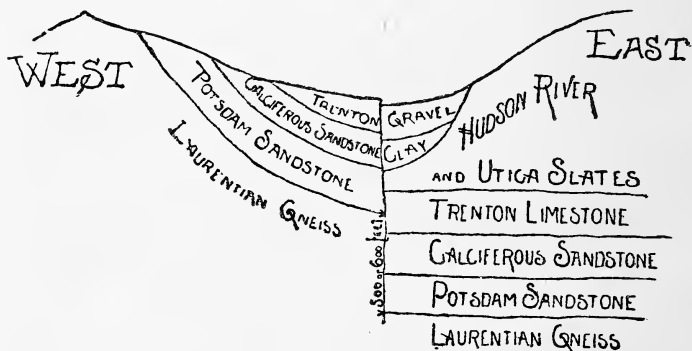
AND HOW THEIR PROPERTIES ARE ACQUIRED.

It has been a cause of much wonderment, among both lettered and unlettered, as to where the apparently inexhaustible, copious, and unvarying flow of these springs comes from. They flow with scarcely a change of temperature, quantity, or quality, from season to season, and from year to year, and now, at the close of the first century of civilized man's acquaintance with them, they are as nearly as possible identical with their composition when first known. Even accurate chemical analyses, made many years apart, fail to show any appreciable change. Perhaps this is not so remarkable, in view of the fact that it seems to be a characteristic of some mineral springs, for the same peculiarity has been observed in Germany and elsewhere.

Many theories are extant concerning the origin of these springs, but there is but one generally accepted among scientists. "The valley in which the springs are found extends in a crescent shape from Ballston Spa to Quaker Springs, a distance of some seventeen miles. The village of Saratoga Springs is located in the very centre of this valley, and includes all the most valuable and most varied of these natural fountains." Through the valley there runs a fault, or dislocation of the earth's crust, affecting a large number of strata. To the north and

SARATOGA MINERAL SPRINGS.

west of this rupture the land has been raised, or that on the other side lowered—it does not matter much which—some 500 or 600 feet. This was accomplished slowly, and the inequality has been completely planed down by glacial action, so that now at the point of rupture it is actually lower than on either side. To the north and west there is a long sloping surface, dipping southward and toward the break. This is composed of porous Potsdam sandstone and calciferous sandstone, resting on a bed of laurentian gneiss, which is nearly impervious to water. Thus all the water falling on this long slope rapidly percolates through the porous sandstones and reaches the break. There it meets a comparatively impervious wall of slates and Trenton limestone, and is forced to the surface, finding exit through the fault.



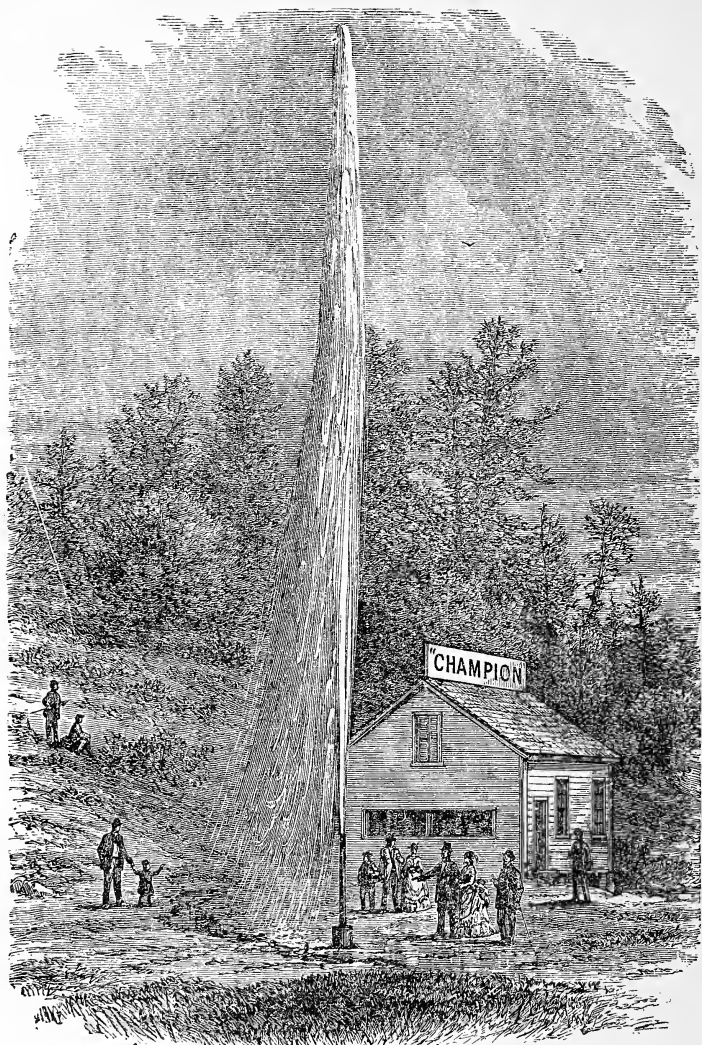
In excavating for tubing the Hathorn Spring, it was found to flow from a crevice in the rock, "wide enough to insert a spade," with the calciferous sandstone on one side and the impervious Trenton limestone on the other. And it is worthy of remark that coming directly from the fault as it does, the

Hathorn Spring has a freer flow than any other of the Saratoga springs.

In proof of the gradual dipping toward the south, it is interesting to note that while the springs come freely to the surface at Saratoga, or are found by digging a few feet below it, those at the Geyser, a couple of miles south, are only reached by boring 130 to 300 feet through the rock; and those at Ballston are found in deep wells and artesian drillings. At Round Lake, still further south, mineral water was found only after penetrating some 1,400 feet. The proportion of mineral constituents increases as you go south, and the water comes from a greater depth.

The method by which the peculiar properties of these springs are acquired becomes apparent after viewing their geological history. By virtue of its solvent power, water takes up the various constituents of the channels through which it passes. It does not merely hold them in suspension, but they are completely dissolved, and the water is crystalline and sparkling. The salts are principally chlorides and carbonates. The first are taken up by virtue of their comparatively easy solubility, and the latter in the form of bicarbonates, being held in solution by the carbonic acid gas, which is forced into the water under pressure. There is also a small proportion of bromide and iodide of soda, and a trace of borax. In addition, in the sulphurous waters there are found sulphates and sulphureted hydrogen. The formation of the insoluble carbonates, as soon as the carbonic acid gas escapes on exposure to the air, has produced the deposit at the High Rock Spring, which is composed of ninety-five per cent. of carbonate of lime.

When we consider that the combined flow of all these springs is probably as but "a drop in the bucket," compared to the prodigious quantities which exist in the subterranean reservoirs, it does not seem so strange that they flow in such changeless profusion year after year.



CHAMPION SPOUTING SPRING.

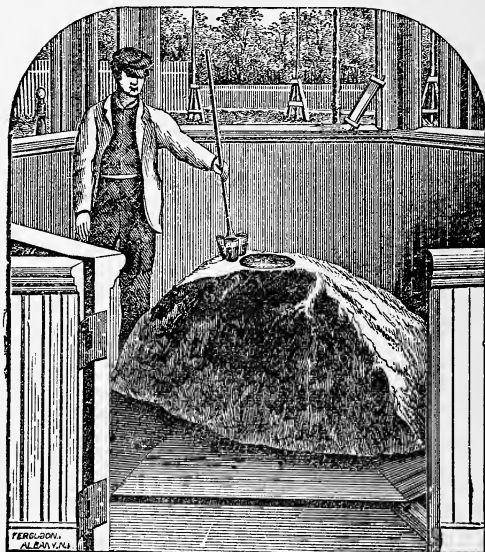
PHYSICAL APPEARANCE OF THE WATERS.

AN examination of these waters would not be complete without a word as to their physical appearance ; one description answering for all. The surface of the springs—such as are not spouting—usually presents a simmering appearance, sometimes approaching active ebullition. This is wholly dependent upon the escape of free carbonic acid gas, which depends somewhat upon atmospheric pressure, as it is evolved more freely before a storm. In addition to the free gas there is a large amount which is termed fixed, from its existing in combination, in the form of bicarbonates. This is rapidly liberated on exposure to the air, and is entirely driven off by heating before the boiling point is reached. The Saratoga Springs have much more carbonic acid gas than any of the German springs, and it is to this that their acceptability to the palate is due. When deprived of the gas they are insipid and flat to the taste, and in the case of the more heavily impregnated waters merely a strong brine.

On first dipping the water from the springs, it is observed to be limpid and sparkling ; or when drawn from the geysers, under a forty-two pound pressure generated by its own gas, as is the case with the Champion, it comes out boiling and foaming like soda water. The waters retain this clear, sparkling, champagne-like quality, even after bottling. They have a brisk saline, acidulous taste, varying much with the different springs. The Red Spring is rather flat ; the Empire, next to it in point of location, is very pungent, as are most of the others. The Champion is intensely saline, while the Vichy, a fine alkaline spring, not far away, is a charming beverage. The iron waters have an inky flavor. The temperature, which does not vary with the season or moisture, ranges at the various springs at from 45° to 52° Fah.

After standing exposed to the air awhile, the perfect transparency becomes clouded, and a delicate white pellicle forms on

the surface. This soon deposits on the bottom of the receptacle, and leads to a rapid incrustation of the sides of the springs and all articles brought in contact with the water. Glasses soon become tarnished, and receive a strong iridescent



HIGH ROCK SPRING.

stain. The High Rock was long ages in depositing the formation from which it receives its name, but at the stronger springs the deposition is so fast that pebbles are soon agglomerated, and even fruit becomes coated with a thick, limy shell, before it has time to decay. The incrustation around one of the spouting springs is already several inches in thickness and rapidly forming a new High Rock. This is undoubtedly largely due to the spray at these fountains allowing the ready escape of the water by evaporation, leaving the mineral behind, as occurs at the High Rock and most of the other springs.

PHYSIOLOGICAL ACTION OF WATERS.

I.—CATHARTIC, OR SALINE LAXATIVE WATERS.

Springs of this class are the Champion, Geyser, Hathorn, Congress, Excelsior, and Union.

MOST PROMINENT CONSTITUENTS.—*Magnesium Bicarbonate; Hydrogen Protoxide; Sodium Chloride; Sodium Bicarbonate, and Lithium Bicarbonate.*

MAGNESIUM BICARBONATE. It is to this salt that the waters owe most of their purgative action. It is laxative usually, rather than purgative, but in the combination found in the springs, when taken in considerable quantity, it proves an active and powerful cathartic. Taken in moderate doses it increases the intestinal secretions, operating by absorption into the system, through the medium of the stomach and excretion from the intestinal glands, whose secretions are thereby greatly augmented. It produces soft and full evacuations from the bowels, unaccompanied by pain or tenesmus. It operates on the liver, gently stimulating that organ.

The dose of the carbonate of magnesium (National Dispensatory) is stated at from 30 to 120 grains. The dose of the sulphate of magnesium (Epsom salts), which is the active principle of most of the foreign purgative waters, is given at from 4 to 8 drams, or 240 to 480 grains. The bicarbonate of magnesium is alkaline, and a pleasing antacid in many affections of the stomach and bowels. The waters of the Hathorn and Union Springs possess the exceptional peculiarity of containing more magnesia than lime.

HYDROGEN PROTOXIDE, or simple cold water, is well known to possess the property of acting on the bowels when taken some time before breakfast. It probably acts partly as a true purgative, and partly through the stimulating effect upon the abdominal organs. It is unnecessary to more than refer to it, but it probably plays no insignificant part in certain cases, especially where its acquaintance is an anomaly.

SODIUM CHLORIDE is not ordinarily conceded to possess any power over the fecal evacuations. In large doses it does produce both vomiting and purging, through gastro-intestinal irritation. It stimulates all the secretions, especially those of mucous surfaces, and it is not at all improbable that it exercises some laxative influence by augmenting the secretions of the intestinal mucous membranes (inside lining of bowels), when taken in large doses, thus fluidifying the feces and causing them to be more easily voided. It has been shown to increase the excretion of urea—the principal waste thrown off by the kidneys, and which, if allowed to remain in the circulation, would produce death by slow poisoning. This salt will be further taken up under the heading of alterative and diuretic waters.

SODIUM BICARBONATE will be discussed under alkaline saline waters.

LITHIUM BICARBONATE. This comparatively recently known and valuable remedy exists in medicinal proportions in some of the Saratoga springs, noticeably so in the Hathorn. It is of great efficacy in gout and lithiasis, and appears to attack and dissolve out urate deposits, for "urate of lithium is the most soluble salt formed with uric acid" (Ringer); more soluble even than bicarbonate of lithium. The significance of this action will be understood and appreciated when it is known that deposits of urates, as they are called, around joints is what constitutes gout. Associated when necessary with mild alkalies and depletory agents it is very successful in this affection.

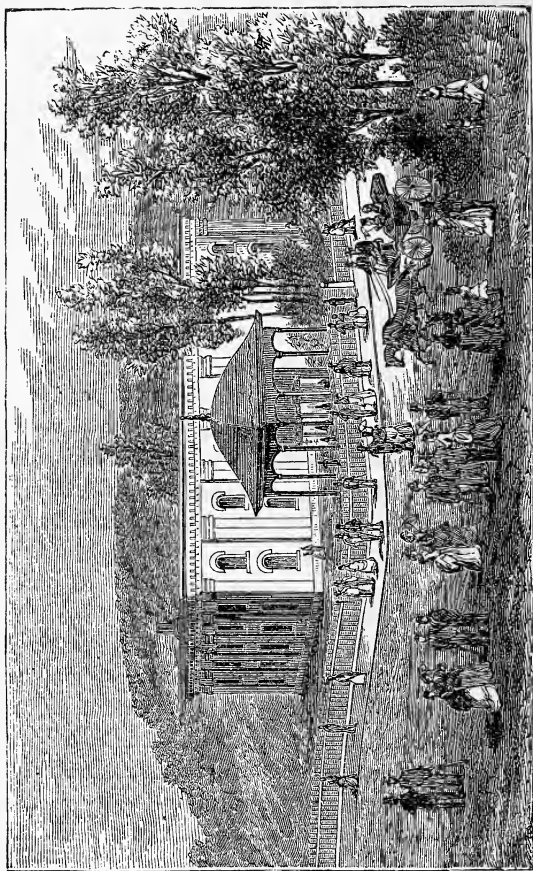
II.—ALTERATIVE AND DIURETIC WATERS.

Springs of this class are the Red, Star, Empire, High Rock, and Crystal, etc.

MOST PROMINENT CONSTITUENTS.—Alterative action often depends as much upon combination as the effect of any one ingredient singly. *Sodium Chloride; Potassium Chloride; Hydrogen Peroxide*, and *Iodide and Ferrous Salts, Lime*, etc., may be instanced under this heading.

SODIUM CHLORIDE. All alteratives act largely by stimulating the skin, kidneys, and the glandular system generally—and by promoting a rapid change of tissue. Nothing does this more universally than chloride of sodium. This arises from the fact that it constitutes an important element in the secretions of all mucous surfaces, and in fact nearly all the secretions and excretions of the body. All glands—as the liver, kidneys, and small glands in the walls of the intestines, etc.—are made active in secreting their various natural products, as bile, urine, etc., by such substances as are, when absorbed into the circulation, carried out of the blood by these various glands; each having its appropriate stimulant in such substances as it especially excretes. Chloride of sodium is the chief source of the hydrochloric acid of the stomach, so important in digestion, and this plays an important part in that vital process. In the blood it occurs in the proportion of four to six parts in a thousand, and in the urine, according to Berzelius, in four and a half parts in a thousand. There is normally two to four ounces of this salt in the human body.

POTASSIUM CHLORIDE. The action of this substance is similar to the preceding, which it closely resembles, but it is not as important to the health of the body. It occurs particularly in the red blood-corpuscles.



EMPIRE SPRING.

HYDROGEN PEROXIDE, or water. This all-important common element is wonderfully necessary for the well-being of all organic life, including human existence. Our corporeal framework is fully two-thirds composed of water. From its composing so large a proportion of both the hard and soft tissues of the body, especially the latter, it causes a rapid formation of adipose tissue, or fat, when freely used. Fleishy people are almost always large drinkers. On the contrary, nothing will emaciate more rapidly than the deprivation of water, or its withdrawal from the system, as in cholera. Prof. Biddle and other medical authorities speak of its value in certain "morbid taints" and for its "alterative effect." It is well known to act as a diuretic, that is upon the kidneys, and it then increases not only the liquid portion of the urine but the solids as well, including even urea. It is genuine physiological food to the body.

IODIDES, FERROUS SALTS, LIME, etc. The quantity of iodine, or sodium iodide, in the waters is a matter of dispute. Analyses differ. At all events it is small, though its presence is easily demonstrated by the deep blue produced by the addition of starch and sulphuric acid, or the violet vapors evolved by means of sulphuric acid and heat. The presence of this substance would account for the value of the waters in scrofula, for iodine is one of the most powerful alteratives known to medical science. The **FERROUS**, or **IRON SALTS**, will be more fully discussed elsewhere. They are well known, in combination with iodine, to present one of the most valuable prescriptions at the physician's disposal. **BICARBONATE** of **LIME**, and some *Phosphates*, and many other minerals are found to be present. The lime is specially noteworthy from its quantity and solubility, and consequent easy absorption and medicinal value. All these agents, singly and collectively, are undoubtedly of great use in determining certain special actions of these spring waters.

III.—IRON (TONIC), OR SALINE CHALYBEATE WATERS.

Springs of this class are the Columbian, Washington, Putnam, Hamilton, and Pavilion.

MOST PROMINENT CONSTITUENTS.—*Ferrum; Carbonic Dioxide; Calcium; Bicarbonate; Sodium Chloride; Potassium Chloride, and Hydrogen Peroxide.*

FERRUM, or IRON, unquestionably ranks among the first three or four most valuable medicines in the pharmacopœia. Its tonic properties far exceed those which stimulate, and it rapidly multiplies the numbers of the red blood-corpuscles, upon which the carrying of oxygen largely depends, and consequently animal heat and the sustenance of life. It is a constant and necessary constituent of the body. Ordinarily, when taken, or when imbibed in mineral waters, it quickens the heart and renders the pulse stronger and fuller. The respiration is also slightly quickened, and the brain is rendered turgid with blood. Too large draughts from the springs produce severe "headache and febrile action, with vertigo or tightness across the forehead, followed by restless nights and loss of appetite." In moderate doses it acts as a tonic to the mucous membrane of the stomach, but may irritate when too largely partaken of. The carbonic acid gas, with which the springs are so richly impregnated, greatly increases the stomach's tolerance. Indeed, the richest ferruginous waters in the world are removed from practical use through the lack of this constituent.

Iron is excreted and passes off principally with the fæces, which it blackens from being changed into a sulphide. A small part (Ringer) is excreted by the kidneys, upon which it seems to exert a specific action. The iron is found in the springs in the form of a carbonate of iron—a preparation long popular with the medical profession. The long continued use of the sulphates of iron, found in most foreign tonic waters, is very apt to produce catarrh of the stomach and intestines, seriously impairing

health and digestion. Judging by results, the use of natural waters is the beau ideal method of administering iron, for not only do they furnish this element in an agreeable and easily assimilable shape, but also nearly every other element essential to animal life. It may be noted that Pymont, the most popular iron spring in Europe, contains less iron than the Columbian, or .5919 grs. (Fresenius) against .698 grs. (Steel) per pint.

CARBONIC DIOXIDE. A little attention must be paid to this element, which plays so important a part in the economy of life. When taken into the stomach a portion of it is absorbed into the system, and passes into the blood-vessels. Its presence there lessens the production of carbonic acid gas from the tissues themselves, and so retards retrograde change. It is the physiological stimulant of the heart and lungs, and starts them into activity to eliminate itself from the body. The pulse is accelerated and becomes hard and full. In the mouth and in the lungs it is changed from a liquid to a gas, as it passes off. This produces cold, by the abstraction of warmth, which always occurs in passing from a solid to a liquid, or a liquid to a gas, and accounts for its refrigerant effect and relief of thirst.

CALCIUM BICARBONATE, or LIME, is a necessary constituent of both hard and soft tissues—of bone, nerve, and muscle. It promotes self-growth and nutrition. The whole framework which protects and supports the body, and renders locomotion possible, is composed largely of it. Hence its importance.

SODIUM CHLORIDE has been frequently referred to. It assists in the digestion of food, especially albumen and starch, and prevents fermentation. So important is it that in olden time one of the severest sentences which an outraged justice could impose, was entire deprivation of salt. It is said that the criminals died eaten up by worms.

POTASSIUM CHLORIDE, of which the Geyser contains by far the largest quantity, has been referred to on a previous page.

HYDROGEN PEROXIDE, a tonic, has been discussed elsewhere.

IV.—ALKALI, OR ALKALINE SALINE WATERS.

Springs of this class are the Vichy and Seltzer.

MOST PROMINENT CONSTITUENTS.—These waters owe their alkalinity principally to *Bicarbonate of Sodium*; a certain amount is also due to the *Bicarbonates of Magnesium and Lithium*.

SODIUM BICARBONATE exists in the body, and is also used to fulfill important medicinal indications. The alkalies in the blood are all in the form of bicarbonates. Sodium bicarbonate is found in the saliva, bile, mucus of throat and intestines, milk, etc. When taken into the stomach it is rapidly absorbed, and as rapidly eliminated by the kidneys. This latter quality renders it useful as a diuretic, and especially valuable in correcting acidity of the urine, and in preventing gravel. The broad law may be stated that salines have a decided tendency to build up and increase the construction of tissue, while the alkalies have an opposite effect. Salines in excess induce scorbutic troubles (scurvy); alkalies produce, after long continuance, an alkaline cachexia, or condition of the system. The tendency of alkalies, therefore, to diminish the amount of fibrin in the blood, and to induce wasting in the body, indicates a class of cases in which they are applicable. Thus, in plethora and obesity in fatty degenerations, etc., there is a fit field for their exhibition. In all these they operate by promoting oxidation. In a second class of cases we find their distinctive chemical action is shown in the neutralizing of acids, as in acidity of the stomach or urine; or in the acid diathesis (general acidity), as in gout, and gravel or calculus (composed of urates), rheumatism, etc. There is still another, and third action attributed to this salt—that is, of acting upon the liver. This action is attested by numerous authorities, and has been sufficiently evidenced in the consideration of the effect of the waters in affections of the liver. See p. 19.

The action of bicarbonate of sodium, which renders the alkaline spring waters of use in dyspepsia, was discussed under the heading of "Gastric and Intestinal Affections," and Ringer's law mentioned. The Vichy is the only spring at Saratoga in which the alkaline ingredients preponderate over the saline—it also contains the least iron of any of the springs, the Union and Congress being next in order. It somewhat resembles the French Vichy. The Seltzer, as before stated, is used almost entirely as a table water. In composition it decidedly resembles the liquid portion of the blood, and its analysis is almost identical with that of the famous German Nassau Seltzer, which latter, however, has recently failed, through the loss of its carbonic acid gas.

MAGNESIUM BICARBONATE is a mild alkali, and all that has been said concerning alkalies in the preceding paragraphs is, in modified sense, applicable to this ingredient.

LITHIUM BICARBONATE. The same is also true of this salt, although its small quantity renders it insignificant as an alkali.

V.—SULPHUR OR SULPHUROUS AND SULPHURETED WATERS.

Waters of this class include the three sulphurous springs situated near Saratoga.

MOST PROMINENT CONSTITUENTS.—*Magnesium Sulphate, Calcium Sulphate, and Sulphureted Hydrogen.*

There are no exact analyses of these springs extant, although examined by Dr. Steel and certain of their constituents demonstrated. The sulphurous impregnation is not great, the waters owing their virtues largely to the sulphureted hydrogen which they contain. The latter is easily absorbed, while the sulphur is probably converted into a sulphide in the small intestines before absorption takes place. In the system this too is converted into a sulphureted gas, which finds an exit by means of the skin, lungs, and occasionally in the urine, milk, and excrement. The portion passing from the skin and bowels is very perceptible to the senses.

If sulphur is taken in any quantity it is excreted in the fæces, principally without absorption. It acts upon all of the above-mentioned excretory glands as a mild stimulant. In small doses its action is largely on the skin, upon which it produces a powerful impression as an alterative stimulant, rendering it of great value in cutaneous affections. The waters are not sufficiently strong to produce a laxative effect.



WHITE SULPHUR SPRINGS HOTEL—SARATOGA LAKE.



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